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Investigation of Environmental

Change Pattern in Japan

(Investigation of Variations in
the Prominent Oceanic Current,
Kuroshio)

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Quarterly Report

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Investigation of Variations in the
Prominent Oceanic Current, Kuroshio

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1. Introduction

This is the report of the research program carried out by the Hydrographic Department, Maritime Safety Agency, on the subject of variation of the Kuroshio and accompanying variation of the sea state, by using the MSS data of LANDSAT-2.

Currently, the Hydrographic Department is making a trial of water mass analysis by comparing the MSS black-and-white photos of the area south of Japan with the sea truth data synoptically obtained in the same area.

2. Techniques

The analysis of vortex pattern are practised by using the enlarged black-and-white print of MSS images. In future, the enhancement of digital color images will be done employing the data color image processing system, and detailed classification of MSS data using CCT is also desirable.

3. Accomplishments

The process for comparison of various MSS images are as in the following:

- a) The outline of the main stream of Kuroshio is grasped by using data taken monthly; the data include temperature by BT and current direction and speed by GEK.
- b) The state of coastal area is grasped by the data of temperature, salinity, transparency, etc. obtained by the local fisheries experimental stations.

- c) The meteorological data, temperature, humidity, wind direction, wind speed, etc. are collected from the Japan Meteorological Agency.

4. Significant Results

In the print of MSS band 4 of "Shiono Misaki" and "Ise" taken by LANDSAT on September 11th, 1975, different water masses can be recognized distinctly. (Fig.1 and Fig.2)

At 35 miles off "Shiono Misaki" is found a vortex pattern (Fig.1) which has an ellipsoidal shape with a diameter of 30 miles and appears to rotate counterclockwise, and in "Ise" water masses which are probably of coastal water are found to spread widely along the coast from the mouth of Ise Bay. Especially, the vortex pattern off Shiono Misaki may be a meso-scale phenomenon which is hardly found by the routine shipboard observation. According to the observations made by the Hydrographic Department, this vortex is located just in the place where the east-going Kuroshio turns its direction southwards to start a large meandering motion to enclose the cold water mass off Enshu Nada Sea. Therefore, this vortex may have been formed as a result of the complex interaction among the strong flow of Kuroshio, counterclockwise current in the cold water mass and the tongue-like pattern of coastal water from Kii Suido Strait.

Comparison of these prints with the sea truth obtained by the Hydrographic Department and other agencies were carried out. The temperature of sea surface obtained from the sea truth shows almost a uniform pattern over the photographed area. Although the distribution of surface salinity and transparency shows a distinct pattern and it has a good agreement with the print pattern of MSS. It seems that MSS data has a valuable information as to water characteristics of each water mass.

5. Publications

No.

6. Problems

- a. The vortex forming process and relation to the Kuroshio.
- b. The relation to the large meander of Kuroshio which began shortly before September 11th on which MSS data were taken.
- c. Precise identification of various kinds of water masses.

7. Data Quality and Delivery

It is desirable to obtain MSS-CCT of Shiono Misaki very shortly together with MSS data in that area taken on other days, if possible.

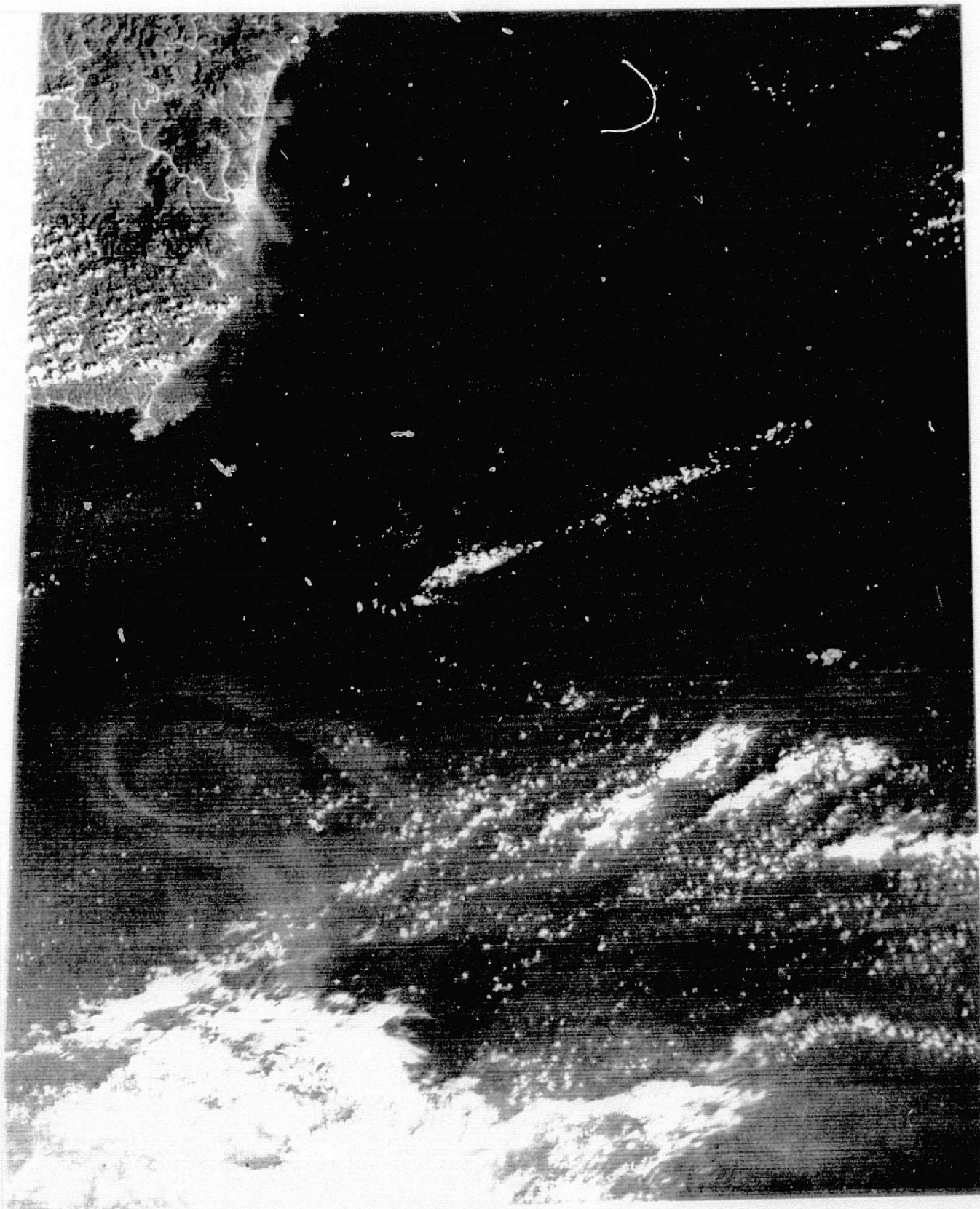
8. Recommendations

It is desirable to obtain MSS data on the Kuroshio and Oyashio areas

in shorter time interval.

9. Conclusions

The MSS data contain new information as to variation of the Kuroshio, and they will contribute greatly to the analysis of the variation of sea state.



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Fig. 1 Ellipsoidal vortex off Shiono Misaki



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Fig. 2 Distribution of coastal waters

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